AMERICAN
GAS JOURNAL
Established 1859 *Pioneer of the Gas Industry*

VOL. 124. NO. 21.
WHOLE NO. 3577.

NEW YORK, SATURDAY, MAY 22, 1926

Subscription, $3 Per Year
$4 Canada $5 Foreign

Library of Congress
MAY 25 1926
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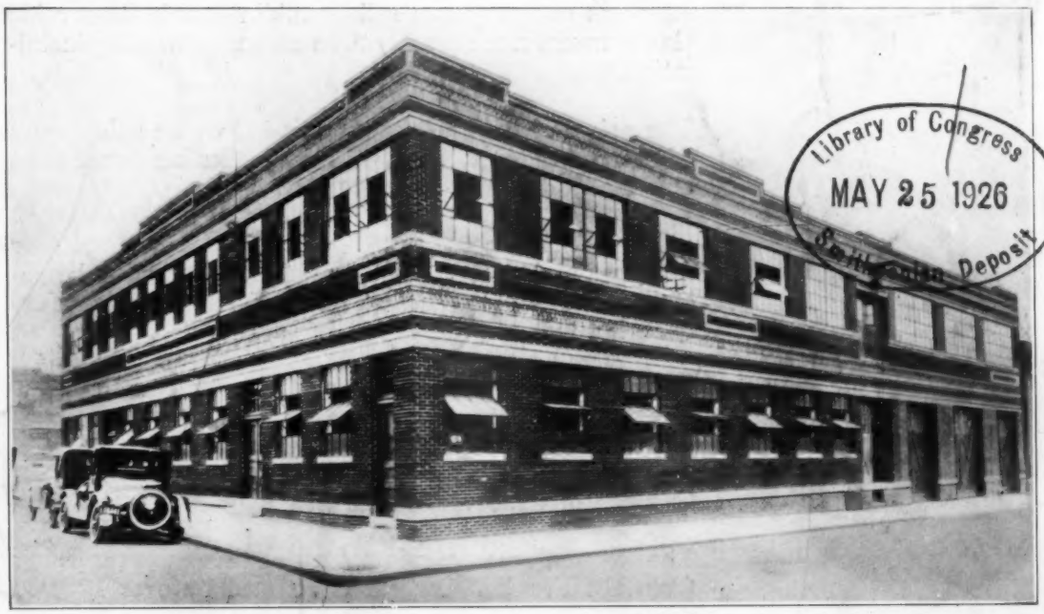

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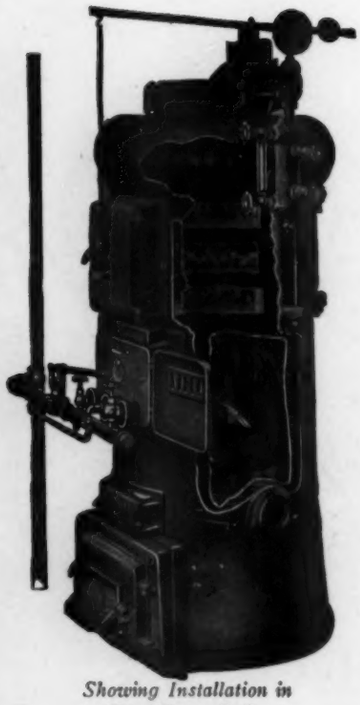

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The Franklin Quick Removable Gas Burner System, as illustrated, is an auxiliary heating appliance for use on coal furnaces and boilers.

It can be easily attached in a few minutes' time. Equipped with a swinging stop cock which makes a leak-proof installation when the burners are in use, and a complete shut-off when the burners are swung out of the way.

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The prime idea of a heating unit is to warm the house when required and this the Franklin Burner outfit most effectually does.

Without the expense of a full equipment of boiler or furnace, piping, etc., the Franklin Burner can be installed in any existing type of coal-fired warm air furnace, hot water or steam heating system.

By this method, the Franklin system augments the value of the coal-fired unit; because it permits the use of gas alone, the usual coal fuel, or a combination of coal and gas; and the necessary changes to accomplish this can be made in a moment's time without tools.

The convenience, comfort and satisfaction accruing from the Franklin method is attested by over 125,000 users.

There is a prolific field for the sale of Franklin Burners and a generous profit to the gas company handling them.

Our special demonstration set will quickly convince prospective buyers and pave the way for greater sales.

Write at once for further details

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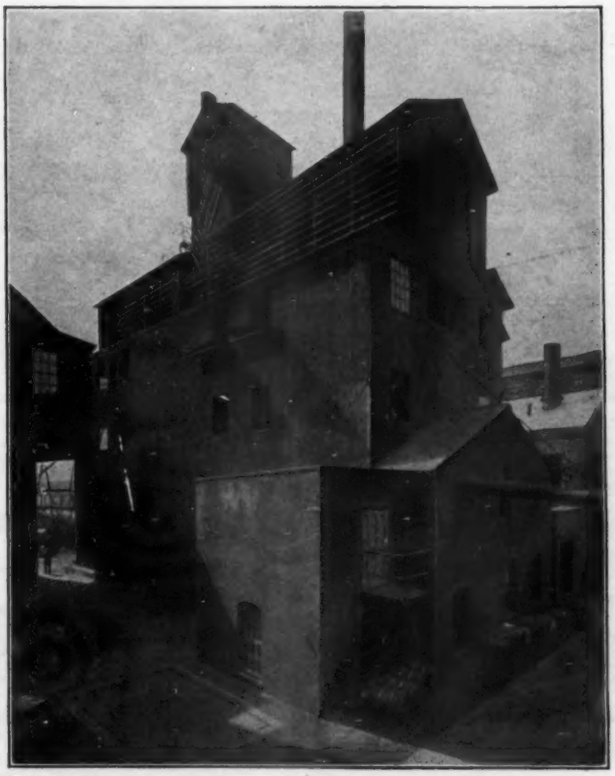

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441 Lexington Ave. New York.

American Gas Journal

SIXTY-SEVENTH YEAR

Published Weekly by American Gas Light Journal, Inc., 53 Park Place, New York, N. Y.

S. G. KRAKE, Pres. & Treas. C. S. MYERS, Vice-Pres. A. M. GLEASON, Sec'y.

STANTON G. KRAKE, Managing Editor ISMAR GINSBERG, Editor

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Subscription $3.00 per year, including postage, in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada, $4.00; foreign, $5.00—Single Copies, 10 cents.

AMERICAN GAS JOURNAL, May 22, 1926. Vol. 124. No. 21.
Published weekly by American Gas Light Journal, Inc., New York, N. Y.
Entered as second-class matter Jan. 9, 1917, at the post-office at New York, N. Y., under the Act of March 3, 1879.

AMERICAN
GAS JOURNAL

Established 1859—Pioneer of the Gas Industry

Vol. 124. No. 21. NEW YORK, MAY 22, 1926 Whole No. 3577

A Ten-Year-Old House Heating Job

The evolution of heating a house with gas in Pawtucket, R. I.

Charles S. Hilton

Pawtucket Gas Company, Pawtucket, R. I.

BACK in the cold, dark days before 1915, John Lawson was paying a man to shovel thirty tons of coal into his furnace every year. After meeting with indifferent success in reducing this coal to ashes, he paid the man to shovel out the remains to be carried away.

In spite of all the money spent for fuel and for labor, the house was almost always too hot or too cold. The temperature could not be held uniform. The thermometer fell to 55 degrees and jumped to 85 with all the fickleness of a light-hearted woman with a variableness that would put to shame even the New England weather.

To a man like Mr. Lawson, who had built up a large manufacturing business by utilizing labor and material to the best possible advantage, this great waste added to the very unsatisfactory service was extremely aggravating. He determined that something would have to be done about it.

Turning to Gas for the Solution

Gas had served its purpose well in the factory and Mr. Lawson just naturally turned to the gas company for a solution of his house heating problem. But the sales manager of the Pawtucket Gas Company, when he was called in for consultation, felt himself between the fire and the frying pan. At that time it was pretty generally recognized that gas heating in New England was entirely out of the question. Coal was selling for about half what it is selling for at the present time, and gas-fired house-heating boilers and thermostatic controls were still an unknown factor.

Yet a salesman must do what he can for a customer. The salesmanager certainly did not want to say that "it can't be done better with gas," and he believed he was telling the truth and fervently hoped he could prove he was, when he replied to Mr. Lawson's questioning:

"Sure you can heat your house with gas, thereby eliminating all of this wasteful labor, and maintaining an even temperature at all times, preventing these colds with which your kiddies are afflicted all winter. I'll submit you a proposition in a few days."

This gas man up to that time had never dreamed of, much less seen, a low pressure, gas-fired steam boiler which could be used for house heating. He had, however, had some experience with high pressure equipment for industrial work.

Put on his mettle and with his mind working at high speed, he set about to devise some method of heating that house successfully. Too much future business hung in the balance to give the matter any but the most studied and careful consideration. That house had to be heated satisfactorily if there was any possible way of doing so.

Not a Case of Cost

It was not a case of cost. It was a case of rendering satisfactory service. With gas at $1.40 per thousand cubic feet, the cost would have to be a secondary consideration. Yet the mere fact of the rate being so high increased the importance of making the installation just as efficient as it could be made.

After much study and a few sleepless nights it dawned upon this sales manager that it would be a very simple matter to take a well known high pressure boiler and convert it into a low pressure one. This could be accomplished by increasing the size of the steam riser outlet and return inlet from

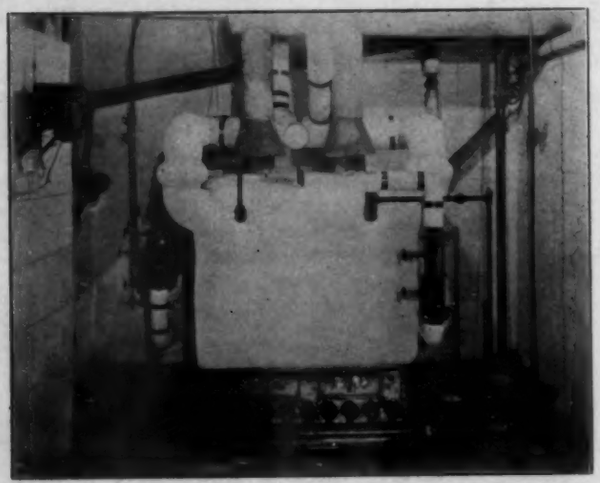
one and a half inches to three inches, and changing the pop valve set at 80 pounds to one set for ten pounds pressure. But what size boiler would take care of the job?

The Mathematical Problem

After carefully measuring the house it was found that 520 square feet of installed radiation was sufficient to maintain a temperature of 70 degrees, but converting boiler horse power to the equivalent steam radiation was a problem he had never before been asked to solve. However, he knew that one square foot of steam radiation would throw off 240 B.t.u.s per hour at one pound pressure. With a total of 124,800 B.t.u.s, found by multiplying the 520 square feet of radiation by 240, and with gas having a heat value of 540 B.t.u.s per cubic foot, it was obvious that at 100 per cent. efficiency 231 cubic feet of gas would be required per hour. He figured that the boiler would not operate at an efficiency greater than 66 2/3 per cent., or that it would be necessary to have a burner capacity of at least 346.5 cubic feet per hour. In this way he arrived at the conclusion that a five horse power boiler was the proper size to select.

Making Plant Automatic

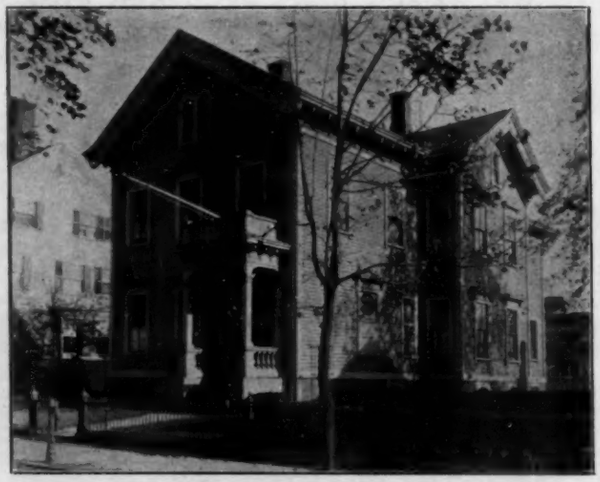
The next problem for consideration was how to make the plant automatic in operation and make certain that it would give no trouble at all, that with no attention it would maintain the temperature of the house at all times at the exact temperature desired. This in itself was considerable of a problem.



Present Gas-Steam Boiler Used in Home of John Lawson

This boiler did not have a quick action valve and it was necessary to find some way thermostatically to control a boiler designed for automatic pressure control only. It was readily seen that inasmuch as the air supply to the burners was fixed, slow turning on and shutting off of the gas would mean reaching a point where an explosive mixture would result in a flash back.

A scheme was worked out in the gas office whereby Rutz lighters were used for pilots in place of the regular equipment. A master lever controlled by a spring motor and operated in conjunction with the chain attached to the main gas valve pressed the buttons of the lights at the instant the gas was fully on at the main burner and released at the time the gas valve started to close off. This arrangement made the pilot the last to turn on and the first to shut off. The spring motor was controlled by the



Home of John Lawson, Pawtucket, R. I., Has Been Gas-Heated for Ten Years

room thermostat placed on the ground floor of the house. An automatic water feed maintained the water in the boiler at the proper level.

When the plans of the installation were completed and a quotation submitted to Mr. Lawson, he was so sure gas was what he wanted, or at any rate experience had shown him that coal was not what he wanted, that he not only gave his order but apparently experienced a considerable degree of joy when he saw the old coal boiler disconnected and carted away. He was looking forward to gas heating as a release from all the unsatisfactory heating service he had paid for in the past.

First Installation of Its Kind

So far as we have been able to learn, this was the first thermostatically controlled house heating boiler to be installed in New England. For three years it was operated successfully.

It was not by any means a perfect gas heating installation, in spite of the fact that it was so much superior to coal that Mr. Lawson would not think of going back to his old system. Therefore, when in 1918 we learned that low pressure boilers were being manufactured for house heating purposes, not only for natural gas but for manufactured gas as well and that a few of the larger cities were experimenting with house heating in a limited way, we began to get the facts about these boilers and their operating characteristics.

What we learned indicated that a boiler of this type with its fewer mechanical features would be a far more desirable proposition for Mr. Lawson than the one he was using. Accordingly, we made him the proposition of bringing his heating system entirely up-to-date and allowing him full purchase price of the equipment he was then using.

Low Pressure Boiler Installed

He accepted this proposition and we installed a number 54-S Bryant gas-fired steam boiler with a rated capacity of 1,185 square feet, using the thermostatic control and the automatic water feed of the previous installation. This boiler is in use today and over a period of seven years not one cent has been expended for repairs.

Just how particular Mr. Lawson is in regard to maintaining a uniform temperature in his home is indicated by the fact that the thermostat is set at 72 degrees the year round, twenty-four hours a day and the boiler is always ready to raise the temperature to that point. If a chilly evening happens along in July and August, the boiler gets busy and raises the temperature to the desired 72 degrees. The boiler is always kept in readiness to serve.

A Testimonial Letter

That it paid to devote all the time and attention necessary to make this installation an entirely satisfactory one is pretty well indicated by the following letter:

Pawtucket, R. I., April 15, 1924.

Mr. Charles S. Hilton,
The Pawtucket Gas Company,
Pawtucket, R. I.

Dear Mr. Hilton:

I have yours of recent date making inquiry regarding my experience with the gas-fired house-heating boiler which was installed in my house several years ago by your company.

If I could not replace this equipment I would not accept five times its original cost. The temperature regulator has maintained an even temperature at all times. This, coupled with a complete absence of noise, dirt and annoyance caused by the furnace going out at intervals and intermittent heat, makes the present installation ideal.

The following average costs as compared to previous years may be of interest to you:

Coast of coal, 30 tons @ $16	$480.00
Attendant's labor	150.00
Ash removal	25.00
Total cost with coal	$655.00
Cost of gas	$550.00
Total with gas	$550.00

Our experience gained through the operation of this gas-fired boiler for seven years, with no expense whatever for repairs, was responsible for the installation of a much larger one at the plant of the Hemphill Company for the purpose of heating the offices and display rooms. This has proven equally as satisfactory.

You may certainly consider me as one of your satisfied customers.

JL:RH. Yours very truly,
(Signed) John Lawson,

Conclusions

Just because this gas man was willing to go the limit to demonstrate that "if it is done with heat, it can be done better with gas," not only was a house heating installation secured ten years ago that has brought the company a total revenue to date of close to $6,000, but it has resulted in heating with gas the offices and display rooms of a large manufacturing plant. This plant installation is helping to sell gas heating to everyone working there.

It is not necessary to take into consideration the many other house heating boilers that have been sold in Pawtucket largely because of the good words spoken by Mr. Lawson to see that in every case where a customer is willing to pay for gas house heating nothing should be allowed to stand in the way of making an installation that will give satisfactory service. A study of house heating costs not infrequently shows that the total cost of gas heating is actually lower than the total cost of coal heating, just as it has proved to be in the case of Mr. Lawson.

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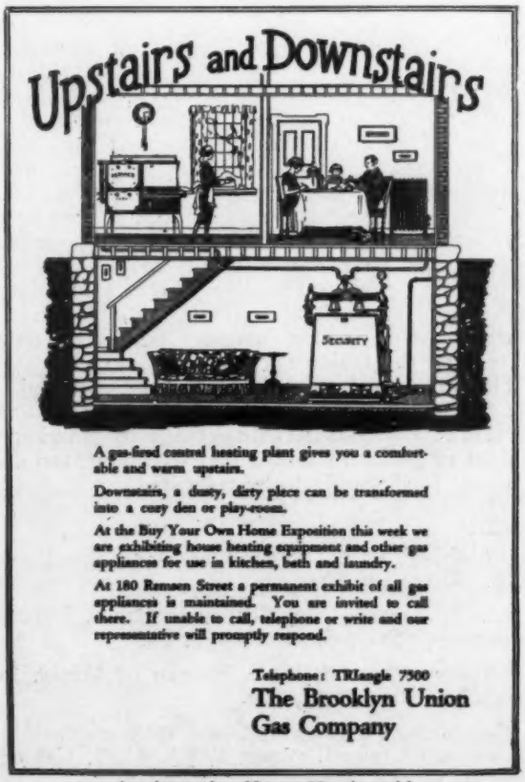
Upstairs and Downstairs
A gas-fired central heating plant gives you a comfortable and warm upstairs.
Downstairs, a dusty, dirty place can be transformed into a cozy den or play-room.
At the Buy Your Own Home Exposition this week we are exhibiting house heating equipment and other gas appliances for use in kitchen, bath and laundry.
At 180 Remsen Street a permanent exhibit of all gas appliances is maintained. You are invited to call there. If unable to call, telephone or write and our representative will promptly respond.
Telephone: TRIangle 7500
The Brooklyn Union Gas Company

An Attractive House Heating Ad

Complete Utilization of Coal and Motor Fuel[1]

A discussion involving the ultimate gasification process

A. C. Fieldner[2] and R. L. Brown[3]

M. R. CAMPBELL[4] of the U. S. Geological Survey estimates the unmined coal of the United States existing within 3,000 feet of the surface at three and one-half trillion short tons. This amount of coal is enough to cover the entire State of Ohio (area 41,040 square miles) to a depth of about 76 feet. "Similarly, if all the coal that has been mined in the United States, plus about 40 per cent for waste, a total of 17,119,010,000 tons, were piled to a height of 76 feet, it would cover a square a little more than 14 miles on either side; in other words, the exhaustion up to the end of 1918 amounted to only about one-half of 1 per cent of the original total supply."[4]

There seems no doubt but that most of this great mass of coal, constituting over 60 per cent of the world's reserve, will still be in the ground when all the petroleum available by drilling and pumping methods becomes exhausted in the United States. For the United States, coal is the logical source of liquid fuel substitutes for petroleum gasoline.

Shale Oil

It is recognized that shale oil and alcohol from vegetable matter will contribute considerable quantities of fuel, but they cannot carry the bulk of the load if we are to continue using anything like the amount of gasoline consumed today.

The average oil shale yields little, if any, greater quantity of distillate per ton than may be obtained by the low temperature distillation of bituminous coal, and coal has the big economic advantage of being mined near the centers of population and in furnishing a residue that can be sold as a relatively high-priced smokeless domestic fuel. Most of our shale is found in the sparsely populated western states and the residue is worthless.

The amount of alcohol that can be obtained from the fermentation industries is also limited. The diversion of any considerable acreage to growing vegetables or grain for motor fuel would cut too deeply into our food supply to be tolerated.

Demand for Motor Fuel Substitutes to Stimulate More Complete Utilization of Coal

We must admit that the present day utilization of coal is far from complete. Much progress has been made in certain lines, but the fires of the beehive coke oven can yet be seen by the traveler between Pittsburgh and New York. The combustion of raw coal and the transmission of the heat to the boiler in our most modern central power stations have indeed almost reached perfection. Eighty-six to 90 per cent thermal efficiency is now being obtained in regular operation in the best powdered coal-fired plant. Much gain in this direction is not possible. However, this great manufactured gas industry and the coking industry are just beginning to see the future possibilities in processing coal to produce fuels of higher form-value and other by-products. The gradual failure of the yearly output of petroleum gasoline to meet the increasing needs of the automotive industries, with the consequent rise in prices of motor fuel, should stimulate the carbonization of coal by both high and low temperature processes. The automobile may yet help to bring about, to no small degree, that desired millenium when the atmosphere of Pittsburgh will be as free from smoke as when George Washington first beheld the beautiful valley of the Monongahela River. This ultimate aim can be accomplished by processing all coal, except perhaps inferior grades, by carbonization processes yielding gaseous, liquid and smokeless solid fuel. Inferior grades may be burned directly in great super power stations, which produce very little smoke. Let us evaluate the present day practical and future theoretical possibilities for obtaining motor fuel from coal.

Processes for Obtaining Motor Fuel from Coal

The processes for obtaining motor fuel from coal may be grouped in three classes:

(1) The carbonization of coal, including the gas manufacturing and coking industry, and low temperature carbonization.

(2) The hydrogenation of coal by the Bergius process.

(3) The complete gasification of coal and conversion of the resulting gases by pressure synthesis into methanol, "synthol" and other liquid combustibles.

Of these processes, only the high temperature carbonization process is in actual commercial use, if we except the distillation of brown coal in Germany, which is done at low temperature.

A number of large scale low temperature experimental units still in a developmental stage are oper-

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[1]Published with the permission of the Director, U. S. Bureau of Mines.

[2]Chief Chemist, U. S. Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.

[3]Organic Chemist, U. S. Bureau of Mines, Pittsburgh Experiment Station.

[4]Campbell, M. R., The Coal Fields of the United States; professional paper 100-A, U. S. Geological Survey, 1922, p. 25.

ating intermittently in both this country and abroad. The principal object in most of these experiments is the production of a convenient form of smokeless solid fuel. Any considerable increase in the price of liquid fuel would probably make some of these low temperature processes commercially successful.

The Bergius Process

The partial liquefaction of coal by hydrogen under pressure according to the Bergius method has been under laboratory investigation in a number of European laboratories, and one of us saw a two-ton per day unit operated by Dr. Bergius at Rheinau near Mannheim, Germany, 12 months ago.

A recent Berlin report in the New York Commercial of September 9 states that "A credit of two and one-half million marks ($600,000) has been allotted jointly by the German government and the Prussian government to the Evag Company toward erecting a factory for producing oils from coal under the so-called Bergius process. This is being erected at the Wenceslaus mine in Lower Silesia. It will have a capacity for treating 200,000 tons of coal dust a year." If this report is true, we should have full information on the commercial possibilities of this process long before it is needed to augment our own gasoline supply.

Synthesis of Methanol

The commercial production of methanol in Germany from carbon monoxide and hydrogen is an assured fact, as witnessed by the methanol importations in the port of New York during the present year. Disturbing as this may be to our own wood distillation industry, it unquestionably puts an entirely new aspect on the ultimate gasoline substitute for motor fuel. Even though pure methanol is an untried motor fuel, the fact that it can now be synthesized on a large scale at a reasonable price opens up a new field of possibilities in which are included the synthesis of other combustible liquids such as Franz Fischer's "Synthol" from water gas,[5] on which he reported at the Baltimore meeting of the American Chemical Society last April.

The future economic significance of Bergius and the synthetic processes will become apparent as we discuss in more detail the yields and the possible total production by carbonizing coal wherein the motor fuel is a by-product. The total quantity of any by-product is necessarily determined by the market demand for the main product.

Motor Benzol from Coke and Gas Works

In the modern by-product coke oven a ton of coal yields from three to four gallons of crude light oil, of which 60 to 70 per cent, after proper refining, may be utilized as motor fuel. During the year 1923, the latest year for which the data are complete and given by the U. S. Geological Survey,[6] the total coal coked was 55½ million short tons, of which two-thirds was made in by-product ovens. The light oil recovered was 135 million gallons, of which 95 millions would have been suitable for motor fuel. This figure is approximately 1¼ per cent of our gasoline requirement of 7,600 million gallons for the year 1924. If all the coal carbonized in 1923 were put through by-product ovens, the yield would not exceed 2 per cent of these requirements, and finally if the entire 1923 output of 545½ million tons of bituminous coal were subjected to the by-product coking process it would furnish only 1,335 million gallons, or about 18 per cent of the gasoline used in 1924. Obviously, the ultimate production of benzol possible can only serve to furnish a limited amount of blending agent for gasoline-alcohol mixtures.

Ethyl Alcohol from Coal Gas

In this connection there is a possibility of virtually doubling the quantity of motor fuel from the carbonization of coal through the conversion of ethylene in coal gas into ethyl alcohol. Bury,[7] at the Skinningrove Iron Works in England, obtained an average yield of 1.6 gallons of alcohol per ton of coal carbonized in by-product ovens in a small experimental plant. Sulfuric acid was used as the absorbing medium to form thyl sulfuric acid, which on hydrolysis yielded thyl alcohol. Although the English experiments were not commercially successful, Vallete[8] has recently reported that a similar process is to be installed in connection with a Claude plant for the manufacture of synthetic ammonia from by-product coke oven gas at the Bethune mines in France. The ethylene is to be separated through compression and refrigeration from the other constituents of the coal gas. The cost is stated to compare favorably with that of distillery alcohol. Should this process eventually prove technically successful, it would afford a means of adding 65 per cent more to the motor fuel per ton of coal carbonized, which would be but 3.3 per cent of the 1924 gasoline consumption if all the coal carbonized during the year were so treated, or 30 per cent for all the coal mined. The most optimistic estimate of expansion in the use of gas and coke would put the total motor fuel to be had from this source nearer the 3.3 per cent figure than the 30 per cent.

Motor Fuel from the Low Temperature Distillation of Coal

Let us now turn our attention from the prevailing method of the coke and gas industry to the field of

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[5]Fischer, Franz, Liquid Fuels from Water Gas, Ind. & Eng. Chem., Vol. 17, No. 6, June, 1925, pp. 574-76.

[6]Mineral Resources for 1923.

[7]Bury, E., Alcohol from Ethylene from Coal Gas; Gas Jour. 148, 718; Gas World 73, 123; Gas Jour. 151, 449.

[8]Vallete, Commercial Manufacture of Synthetic Alcohol; Chimie et Industrie, 13 (1925), pp. 718-21.

low temperature carbonization which, according to many writers, affords a means of replacing our petroleum resources. It is an established fact that the low temperature distillation of coal yields from two to two and a half times as much tar per ton as high temperature carbonization. Carefully conducted large scale tests by the Fuel Research Station in England[9] gave 1.4 gallons of light oil distilled from the tar and 1.6 gallons scrubbed from the gas—a total of three gallons per ton of coal. Fischer and Gluud in Germany obtained 2.0 to 3.8 gallons, and Davis and Parry[10] of the Bureau of Mines obtained 4.5 gallons of light oil suitable for motor fuel from the low temperature distillation of a Pittsburgh district coal on a laboratory scale. These yields are of the same order as the benzol yields of high temperature carbonization. However, they can be augmented by the pressure cracking of the low temperature tars, as shown by Morrell and Egloff,[11] who report a yield of 17 per cent of the total tar converted into oil distilling below 230 degrees C. Assuming an average yield of 25 gallons of tar, this would mean 4.25 gallons of motor fuel per ton of coal, or a total of 6 gallons, including that scrubbed from the gas.

Low Temperature Coke

Low temperature coke is not suitable for metallurgical purposes, hence the development of this industry will not reduce the amount of high temperature coke made. Its logical field is in the processing of our poorly coking and non-coking coals and lignites for the production of smokeless solid fuel. It is reasonable to expect in the relatively near future that 100 million tons of bituminous coal, an amount equal to the annual anthracite production, will be carbonized at low temperatures. This amount would yield 600 million gallons of motor fuel, or about 8 per cent of the 1924 gasoline requirement. Another reasonable expectation is that super power stations will carbonize coal at low temperature and generate steam from the pulverized residue. The 60 million tons[12] of coal burned in central power plants would thus provide 360 million gallons of motor fuel which, added to the yield from plants making domestic fuel, would furnish a total of 960 million gallons, or 13 per cent of the annual requirement. Thus it is evident that the maximum possible development of low temperature carbonization can not serve to furnish more than 20 to 30 per cent of the annual requirements, based on present-day consumption. We must turn to processes in which motor fuel is one of the principal products rather than a minor by-product.

Motor Fuel from Bergius Process of Liquefying Coal

Of these the Bergius process deserves serious consideration since it converts from 25 to 50 per cent of the coal into tar and oils, the yield varying with the type of coal and the conditions of hydrogenation. In this process pulverized coal mixed with oil or tar to form a thick paste is heated at 400 to 450 degrees C. in an atmosphere of hydrogen under a pressure of 150 to 200 atmospheres of hydrogen. Under these conditions the coal is converted into a black, tarry liquid, which, on distillation up to 300 degrees C., yields oils and tar to the extent of 20 to 40 per cent, according to various reports. No reliable information is available on exact yields or what proportion of this tar can be refined into motor fuel distilling under 150 degrees C. Kling[13] reports 15 per cent. One of us who visited the plant at Rheinau a year ago was told that 20 per cent of the coal was converted into neutral oils boiling below 230 degrees C. and 10 to 15 per cent below 200 degrees C. On the basis of a 230 degrees C. end point gasoline, one ton of coal would yield 50 gallons. It is claimed that retreatment of the heavier oil increases the yield of lower boiling constituents. Other investigators, notably Shatwell and Graham[14] in England, and Fischer and Frey[15] in Germany, have confirmed the essential facts of the Bergius process. Fischer and Frey, working at 75-100 atmospheres at 425-450 degrees C., converted semi-coke from brown coal into oils and gas in 45.2 per cent and 30 per cent yields, respectively.

We may, therefore, regard the Bergius process as one of the possible future methods for making a petroleum substitute from coal. But it must be emphasized that in this process a gasoline substitute is only one of the products, the gasoline being in about the same proportion as in a light crude petroleum. From the standpoint of motor fuel production, the direct synthesis from gases seems more economical.

Synthetic Motor Fuel from Gases

The investigations of Patart[16] and Audibert[17] in France, and of Fischer[18] and the Badische Anilin and Soda-Fabriken in Germany, together with the pro-

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[9]Fuel Research Board Report for the years 1920-21, second section; Low Temperature Carbonization (H. M. Stationery Office).

[10]Carnegie Institute of Technology Bull. 8, 1924.

[11]C. A. p. 1770; 2407 (1925).

[12]Power, Jan. 6, 1925, pp. 2 and 20.

[13]Kling, M. Andre, Liquid Combustibles from the Bergius Process, Chaleur et Industrie, Special Number, December, 1924, pp. 53-71.

[14]Shatwell, H. G., and Graham, J. Ivon, The Hydrogenation and Liquefaction of Coal; Fuel in Science and Practice, Vol. 4, pp. 25, 75, 127.

[15]Brennstoff-Chemie 6, 69-79 (1925), C. A. 19, 1768.

[16]Patart, Georges, A New Field of Catalysis Under High Pressure; Commercial Synthesis of Methanol; Chimie et Industrie 13, pp. 179-85 (1925).

[17]Audibert, Etienne, The Manufacture of Synthetic Liquid Fuels from Mixtures of Carbon and Hydrogen; Chimie et Industrie 13, pp. 186-94 (1925).

[18]Fischer, Franz, and Tropsch, Hans, Ueber die Herstellung von Synthol durch Aufban aus Kohlenoxyd und Wasserstoff; Brennstoff-Chemie 4, 193; and 5, 201, 217.

duction of methanol from carbon monoxide and hydrogen on a commercial scale by the latter, has put a totally new outlook on the entire subject of our future motor fuel supply. In this process, pure methanol is produced from two volumes of hydrogen to one of carbon monoxide when subjected to pressures of 150 to 250 atmospheres and temperatures of from 300 to 425 degrees C. in a copper-lined reaction chamber, containing one or more of a number of catalysts which include zinc oxide or oxides of chromium, vanadium, manganese, tungsten, uranium, lead and bismuth. The cost reported from both French[19] and German[20] sources varies from 18 to 27 cents per gallon. About 18 per cent of the heat value of the constituent gases is consumed in the conversion. There are no by-products. On a volume basis, the net or low heating value of pure methyl alcohol is about 60 per cent of that of gasoline. Ricardo[21] has shown that the indicated thermal efficiency at the highest useful compression for methyl alcohol is 35.0 per cent, as compared to 31.4 per cent for gasoline at its highest compression—the compression ratios being 5.2 for methyl alcohol and 5.0 for gasoline. It should, therefore, require 1.5 to 1.6 gallons of methyl alcohol to be the fuel equivalent of one gallon of gasoline. One ton of coke should yield 350 gallons of methyl alcohol.

Synthesis of Fuels of Higher Heating Value

However, we need not confine ourselves to methanol, the experiments of Franz Fischer[22], Director of the Institute for Coal Research at Muelheim-Ruhr, show that fuel mixtures of higher heating value can also be synthesized from carbon monoxide and hydrogen. Fischer and his associates have produced on a laboratory scale from water gas a mixture which they term "synthol" that consists of a mixture of alcohols, aldehydes and ketones with small quantities of hydrocarbons. Water gas plus hydrogen is subjected to a pressure of from 75 to 150 atmospheres at 400 to 425 degrees C. in a steel reaction chamber containing a catalyst prepared from iron and a solution of sodium carbonate and consisting presumably of sodium ferrite. By-products of this reaction are carbon dioxide, methane and water. By recirculation of the gases, about one-third of the original water gas is converted into liquid products, having a distillation range similar to gasoline, and a heating value of 8,200 calories per kilogram. This process is yet in its early laboratory stages, but it indicates that further developments along this line may be expected, especially since other laboratories both in the United States and abroad are taking up research in this field.

Economic Relationship of Motor Fuel Synthesis from Gas to Other Industries

Assuming the feasibility and the development of synthetic motor fuel from gas, and granting that the day of universal use of composite fuels is coming, let us consider where these processes will fit into our present and future industries. Will the petroleum or the gas and coke industry be in the better economic position to make synthetic fuel?

The Petroleum Industry and Synthetic Fuel

Since the waning of petroleum gasoline will be a gradual process it would seem logical for the large petroleum refiners to install synthetic processes to augment their gasoline supply just as some of the natural gas companies are now adding water gas to their natural gas to make up the required volume. The large refineries have the organization, financial resources and the distributing systems to market the fuel. The methanol and synthol processes are peculiarly adapted to this purpose since the entire product can be converted into motor fuel.

The Manufactured Gas Industry and Motor Fuel

However, the petroleum industry is likely to have strong competition from the manufactured gas industry which has an inherent economic advantage in that they are engaged in the manufacture of water gas, the raw material for methanol and "synthol."

The summer months, when the need for motor fuel is greatest, is the period when gas plants have much idle capacity which must be maintained to carry the peak loads of the winter season. The addition of synthetic motor fuel units would serve to give an even load and at the same time permit the unhampered development of domestic house heating, which at the present time is increasing the top-heavy winter loads.

The gas utility companies also have natural advantages in selecting the most economic process for providing the necessary constituent gases and in disposing of residual gases from the process. For example, in making methanol, they can manufacture the coke for making the water gas in by-product ovens, separate the requisite extra volume of hydrogen from the coke oven gas, and use the remaining B.t.u. rich-in-methane gas for enriching water gas for city distribution. Such enrichment will be needed to take the place of the present-day oil carburetion. The ethylene can also be converted to ethyl alcohol which, with the benzol from the coke ovens, can be mixed with the methanol for motor fuel.

Should the synthol process prove more economic, the gas utility will again be in the best position to

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[19]Patart, loc. cit.

[20]Elworth, R. T., Canadian Chem. Met. 9, 139 (125).

[21]Report of the Empire Motor Fuels Committee; the Inst. of Automobile Engineers, vol. 18, part 1 (1923-24), p. 144.

[22]Fischer, Franz, Liquid Fuels from Water Gas; Ind. & Eng. Chem., Vol. 17, p. 574 (1925).

utilize the residual methane for enrichment purposes.

The public utilities distributed in 1924 some 500 billion cubic feet of manufactured gas, of which 74 per cent was carburetted water gas. The estimated annual idle capacity of these water gas plants is 350 billion cubic feet[23]. This amount of gas will produce 1500 million gallons of methanol or 300 million gallons of the mixture "synthol." Fifteen hundred million gallons of methanol is 13 per cent of the 1924 gasoline consumption. The inevitable growth of the gas industry will provide a much larger capacity and the expansion required to take care of the entire demand is a distinctly practical possibility.

Conclusion

Before concluding this review of the relation of the complete utilization of coal to motor fuel, we wish to state that our discussion has been confined solely to liquid substitutes from coal for petroleum gasoline that can be used in essentially similar internal combustion engines. We recognize that Diesel type engines using heavier oils, gas producers using coke and semi-coke, and even compressed gas engines may be used, especially on trucks. But the most promising solution of the motor fuel problem of the distant future is in the synthesis from coal gas and water gas, since there are no inherent quantity limitations imposed by the market for other products. We do not mean to say that any large amount of substitute will be needed for gasoline in the near future. We may need some substitutes in five years, or it may be 25 years. However, we know that the time for research is here. The French government has already established a laboratory for motor fuel research. The German government and the coal industries are jointly financing similar research.

The Fuel Research Station in England is investigating the hydrogenation methods and some of the petroleum and automobile industries in this country are at work on the problem. Our own coal and gas industries are not yet in the field. We hope that they, too, will lend their support to American chemists so that our country can maintain its commanding position in the field of motor fuels.

[23]Personal estimate.

Cooling Homes with Gas*

An analysis of a new field for gas refrigeration

A. R. Stevenson, Jr.

COOLING homes would be a large field for refrigeration which might be developed to complement the house heating load. Refrigeration and house heating could be more closely allied than might be supposed. About fifty years ago Lord Kelvin suggested that houses could be heated by means of refrigerating machines much more efficiently than with furnaces. Lord Kelvin had in mind compression refrigerating machines, which are more efficient than the absorption type. In our northern cities, it would be too expensive to heat a house by converting electricity directly into heat; but, if electricity is used to run a motor-driven compression refrigerating machine, it would be possible to deliver 3 B.t.u. to the house for every B.t.u. of electricity delivered to the motor. Such a scheme would go a long way toward making the electrical heating of houses sufficiently economical for consideration.

Although absorption refrigerating machines are not so efficient as those of the compression type, the losses are not so serious when the apparatus is used to produce heat because the losses are all in the form of heat. This committee is probably more familiar with gas-heated domestic refrigerating machines than any other type. On page 54, of the 1925 "Refrigeration with Gas" Report, figures are given to indicate that 125 cu. ft. of gas will produce refrigeration equivalent to the melting of 100 pounds of ice. One hundred and twenty-five cubic feet of gas would probably contain about 62,500 B.t.u. The heat balance for the machine could then be written:

Heat Balance

	B.t.u.
Refrigeration equivalent—100 lbs. of ice....	14,400
125 cu. ft. of gas.....	62,500
Total heat delivered.....	76,900

Thus, if the evaporator were put out of doors and the dissipation of heat from the machine and condenser used to heat the house, one could, with such a machine, deliver twenty-three per cent. more heat than was contained in the gas burned.

* Presented at the meeting of the Refrigeration Committee, Commercial Section, A. G. A., in New York City.

The only article on large absorption refrigerating machines which I have been able to locate easily is "Absorption Refrigerating System," by G. H. Pardee, which appeared on page 259 of "Refrigerating Engineering," Vol. 9, No. 8, February, 1923. This article states that 744 pounds of steam at 9-pound gauge pressure are required to produce one ton of refrigeration. Assuming that the steam is generated at 9-pound pressure from boiler feed water at 70°, the heat supplied would be 1,122 B.t.u. per pound, or 835,000 B.t.u. per ton of ice.

To freeze a ton of ice would require the abstraction of 288,000 B.t.u. but if we include the preliminary cooling of the water it would be necessary to abstract at least 344,000 B.t.u. in order to make a ton of ice. The heat balance for such a machine is, therefore:

	B.t.u.
Refrigerating effect	344,000
Heat input	835,000
Total heat delivered	1,179,000

This plant, therefore, delivers to the condenser approximately 41 per cent. more heat than was contained in the steam.

Saving In Fuel

These figures indicate that a refrigerating plant for house heating could probably be designed which would deliver about one-third more heat to the house than was contained in the fuel. This is the same thing as saying that a 25 per cent. saving in fuel could be obtained by using a gas-heated refrigerating machine to pump heat into a house during the winter. This saving in fuel during the winter months alone would pay part of the interest and depreciation on the first cost of installing the refrigerating apparatus.

Many families burn about fifteen tons of coal each winter, which, at $14 per ton, would cost $210. There are about 14,000 B.t.u. per pound of coal. The ordinary household furnace has an efficiency of approximately 33 per cent. Therefore, the actual heat put into the house is approximately 140 million B.t.u.

If a gas furnace were installed which utilizes all the heat from the gas, about 280,000 cubic feet would be burned. The best gas-heated furnace, however, is probably not more than 85 per cent. efficient, and, therefore, at least 330,000 cubic feet would be required. At 90 cents per thousand cubic feet, the annual bill for gas burned in the furnace would be about $300.

If refrigerating apparatus were installed, the same heat could be delivered to the house for 25 per cent. less gas, and the bill would be decreased $75. If interest at 6 per cent., depreciation at 10 per cent., and a 4 per cent. profit were included, the fixed charges would be 20 per cent., and this $75 could be capitalized at approximately $375.

Further Calculations

A house requiring fifteen tons of coal a year might in the dead winter require a maximum of three tons per month, which at 33 per cent. efficiency, would mean a rate of 28 million B.t.u. per month. Therefore, the refrigerating machine would have to be large enough to deliver 930,000 B.t.u. per day to the house. If 25 per cent. of this heat is obtained from refrigeration, then the refrigerating effect would be 230,000 B.t.u., or the equivalent of 1,600 pounds of ice per day. I have not consulted any manufacturers of gas-heated absorption refrigerating machines, but I imagine that a plant of this capacity could be purchased for less than $2,000. About $200 could be credited for the furnace, which would then be unnecessary, leaving a net investment of about $1,800. Subtracting the capitalized cost of the fuel saved during the winter, the remaining investment would be $1,425.

The question now is, whether the type of family which lives in a house which burns fifteen tons of coal in the winter would be willing to make an investment of $1,425 for refrigerating apparatus to keep the house cool in the summer. The refrigerating capacity of such a system would be about one-quarter the heating capacity. Therefore, if the heating capacity of such a system would be about one-quarter the heating capacity. Therefore, if the machine is capable of maintaining an 80° temperature difference between a 70° F. interior and a —10° F. exterior in winter, it should be capable of maintaining a 20° difference between a 70° F. interior and a 90° F. exterior in summer if the windows are kept closed.

Amount of Gas Required

About the same amount of gas would be required in either case—namely, 1,850 cubic feet per twenty-four hours, which at 90 cents per thousand cubic feet would be $1.66 per day. The apparatus, however. would probably not be operated to full capacity throughout the whole twenty-four hours, and the daily bill might be around $1.

The problem of cooling the home can, therefore, be stated:

1.—Investment, $1,425.
2.—Operating cost on days when apparatus is used, $1.00.
3.—Trouble.
4.—Danger.
5.—Humidity.
6.—Insulation.

The answers to problems (1) and (2) have already been suggested.

Answer to Third Problem

With regard to problem (3), most householders would hesitate to undertake the operation of a four-fifths ton ice plant constructed as commercial plants are constructed today. But, if the more or less fool-proof domestic refrigerating machines could be increased to twenty or thirty times their present capacity without sacrificing any of these fool-proof features, such objections might be overcome.

Fourthly, absorption machines are considered, by many people, to be more dangerous than those of

the compression type. It would be very hard to persuade municipalities to allow the installation of pressure-fired apparatus containing perhaps 50 pounds of ammonia.

No matter what system of refrigeration is used, precautions will have to be taken to prevent excessive humidity. It will probably be necessary to condense some of the moisture out of the air by cooling it below the desired temperature and then letting the air warm up somewhat before discharging it into the house.

I believe that a comparison of the cost of additional insulation with the resulting saving in system capacity and reduction in fuel cost, both winter and summer, would show that the average house today is not economically insulated; but I have not investigated this point. It should be noted that the rate of heat leakage through the walls of the house used in the above calculations was estimated from a rough guess as to the fuel required to heat an ordinary house in winter.

In closing, it might be said that if the refrigerating equipment is to be used only for cooling the home in summer, an electrically-operated compression machine would be preferable. There are many such installations already in public buildings in some of our large cities. I believe the only hope for gas in this field of cooling homes is the combined use of the same equipment winter and summer, which I have outlined above.

Gas in Making the Electric Lamp

An interesting use of gas in General Electric Company plants

J. B. Nealy

Surface Combustion Company

THE electric lamp, although not a complicated thing, is formed of ingredients from different corners of the earth. For the bulb and the base of this magic light of the ages comes silica and clay from deposits in North America; for the wires and socket, copper is sent from the high altitudes of South America; for the delicate filaments comes tugnsten from the listless mines of China. Tungsten, after all, is one of the most essential ingredients; without it sustained incandescence would be well nigh impossible.

This metal is mined and concentrated in China and when it reaches the General Electric Company in America it contains from 25 to 40 per cent. rock and other impurities. In the works at Little Ferry, New Jersey, pure tungsten oxide is extracted from the ore. By a process of heating in hydrogen, the oxygen is then driven off and practically 100 per cent. pure tungsten metal is thus obtained.

It is interesting to note that only a few years ago tungsten was considered a rare metal and was produced only in the chemical laboratory. Today at the Little Ferry plant of the General Electric Company this metal is produced by the ton.

First Use of Gas in Ore Reduction

The reduction of the tungsten oxide, which is the crux of the whole process, is accomplished in gas-fired furnaces designed by the Surface Combustion Company of New York. The furnaces combine a new type of burner and method of combustion and heat radiation, which gives them a high rate of efficiency and low maintenance cost.

The reduction furnaces used at the Little Ferry plant are known as tube furnaces. They are twelve feet long and contain from ten to twenty small heat resisting tubes which protrude through the walls of the furnace at each end. Provision is made for circulating pure hydrogen through these tubes. The tungsten oxide in powder form is placed in small metal boats which are inserted and advanced periodically through the tubes. The furnace is operated at a temperature of 1400 degrees F. The total time required for a single charge to pass through the heat zone is approximately three hours. The metal as produced is in the form of a fine grey powder. From this point the fabrication of the metal is continued at the Harrison Wire Works.

The metal powder is pressed into small ingots under a pressure of ten tons per square inch by means of a hydraulic press. These pressed ingots are then electrically sintered at a temperature of 5500 degrees F. At this stage, the ingots are very hard and exhibit a metallic lustre.

Heating the Ingots

After sintering, these ingots are heated in a series of gas furnaces and swaged down to .030 inch in diameter after which they are drawn down to .0025 inch as an average diameter. They are then ready for the lamp. Tungsten wire requires a very high swaging temperature, and to swage continuously at a high rate of speed requires a furnace capable of developing a dazzling white heat. The furnace develops a heat of 2900 degrees F.

(Continued on page 458)

Helping Customers to Burn Gas Efficiently

East Ohio Gas Company gets a newsy slant into advertising

Frank H. Williams

THE other day the advertising manager for a successful daily newspaper walked into the office of the superintendent of the local gas company.

"Say," said the advertising manager, "why don't you folks do some advertising in our paper? Other public utilities advertise in our paper, and gas companies in other cities find that newspaper advertising pays them big. How come you don't get in line and make use of this medium in increasing your business?"

"Well," replied the gas company superintendent, "we might advertise if there was anything new to say about gas. But everything that can be said about gas has been said. If you can think up a new slant for us, we'll be glad to use your paper. But unless you can get a new slant for us there's nothing doing. Let's see what you can do about it for us."

So the newspaper advertising manager got busy at once. He wrote to a considerable number of papers in the middle west for samples of the gas company advertising being run in their pages and from the replies to his letters picked out the advertising of the East Ohio Gas Company, of Akron, Ohio, as being particularly good and as offering suggestions which the gas company in his own town could use with good results.

In view of all this it will, undoubtedly, be interesting and valuable to other gas companies to consider the publicity being used by this particular concern.

The Basic Theme of the Advertising

The theme upon which this striking series of advertisements of the East Ohio Gas Company is based is that of helping consumers burn gas to the best possible advantage. With this thought in mind the various advertisements in the series take up the different ways in which the company's consumers use gas and make suggestions that will help in getting better results in each method of burning gas.

Each of the advertisements in the series is headed "How Do You Burn Gas?"

The Water Heater Ad

One of the advertisements dealt with the proposition of burning gas in water heaters and this particular advertisement read in this manner:

"WATER HEATERS.

"The water heater is a necessary and friendly little gas appliance.

"It does not burn much gas—but it means much to happiness and to comfort.

"Both its convenience and its economy depend on how well it performs its task.

"Maybe you don't know just how well it can perform if given a better chance.

"At the Gas Office are water heaters and a demonstrator to show you the best ways of using them.

"We do not sell appliances, but show them for demonstration purposes only.

"The East Ohio Gas Company."

Right there, in the last sentence in this advertisement, there's a mighty good thought which may offer worth while ideas and suggestions to other gas companies. Even if the gas company doesn't sell appliances, it is certainly a good proposition to have them in the office so that the users of appliances can be shown by the company's experts just how to burn gas in them to the best possible advantage.

The Blue Flame

Another one of the advertisements in the series read like this:

"THE BLUE FLAME.

"When gas burns properly it draws enough room air in with it to the burner to furnish the flame with the oxygen which is required for combustion.

"Gas is admitted to the burner through an opening in the burner called the orifice.

"Burners are easily adjusted so that the proper amount of air will be admitted to maintain combustion at its greatest efficiency.

"The heat and cleanliness of the flame are greatest when the burner is thus adjusted correctly.

"At the same time this clean, hot flame is also the most economical. The correct flame is blue or violet colored. That is the way for the user to tell it.

"A yellow or white flame is wasteful of gas, lacking in heat, and dirty. It means faulty adjustment of your burners.

"If you do not know how to adjust them yourself, visit our Service Department or call our demonstrator on the phone.

"It takes only a minute for us to explain how it is done. The results may surprise you."

Things That Count

Another of the advertisements in the series read like this:

"THINGS THAT COUNT.

"Trifles mount up when they happen fast.

"A gas range is in almost constant use. Its habits and your habits in using it mean a great deal in the results you get and the amount of gas it takes to get them.

(Continued on page 460)

GAS MERCHANDISING

Domestic – Industrial

Ideas for the Man Who Sells

William H. Matlack

WHEN A CASHIER IS "CATTY"

WE know of a cashier who, because of indigestion, domestic troubles or something else, is very "hard boiled" and who because of this attitude makes many enemies for the gas company. It is not so much what he says but the way he says

it. When folks part with their money, they like to turn it over to a fellow who extends the glad hand, who smiles, and thus shows that he is glad to get it. Salesmen say this "catty caustic" cashier makes selling hard for them in many, many instances, for people do not like to face him in making their monthly payments and hence have purchased elsewhere.

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HOW MUCH DOES IT TAKE?

ACCORDING to Current Topics: "One of the simple questions Simple Simon failed to ask the pie man was, 'How much gas does it take to bake a custard pie?'"

Based on expert analysis of gas consumption, here is the answer:

Custard Pie—Ten cubic feet of gas will bake one or more pies, according to oven size.

Bread—Twenty-five cubic feet will bake from one to eight loaves at once, depending on the size of oven used.

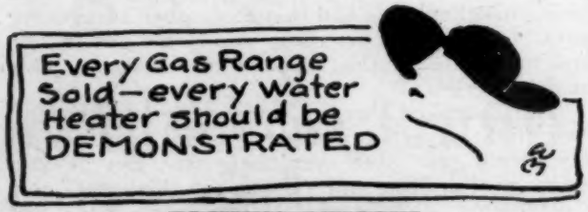
Roast chicken—Thirty-five cubic feet will roast one three-pound chicken.

Bean soup—Six cubic feet will cook a quart.

Coffee—One and one-third cubic feet will prepare a quart.

Hot water—Twenty cubic feet will heat twenty gallons to a boiling point, enough water for an average family wash.

Less than 100 cubic feet of gas a day is used to do the cooking and heating for an average family of five.



COOKING SCHOOLS

A GREAT many gas companies have decided to conduct cooking schools this spring and summer, and the word is going around that in most cases there will be no attempt to sell appliances to those who attend these schools. However, anyone interested in any of the appliances on display or used during the demonstration will be able to secure any and all information regarding prices and terms by filling in a slip that will be obtainable in the demonstration or school room. One sales manager said he had decided upon employing this method to provide his salesmen with prospects, as he had heard of instances where the salesmen felt

that the school cut down his chances for sales in many cases. We cannot see that a school would cut the salesman out of any sales; we feel on the other hand that it would be a big factor in stimulating sales, or, as everyone knows, there are many people who can be sold only after having seen an appliance demonstrated, and that is just what the domestic science expert does when she conducts a cooking school. She not only tells how but she shows those in attendance how. We regard demonstrations of this kind as a profitable selling method for they instill the desire for more and better cooking into the mind of every person attending them. We must watch that domestic load!

As The Journal Views It

A SERIES ON OFFICE ORGANIZATION

The Editor is pleased to announce that commencing with an issue in June there will appear in the American Gas Journal a series on "Office Organization and Management," to be prepared by G. L. Harris, of Chicago, Ill. Mr. Harris has had considerable experience in installing office systems in public utility companies, among which may be mentioned the Insull Companies and the Georgia Railway, Light & Power Co.

It has often been felt that the office of the gas company has not been given as much attention as other branches of the business. Whether or not this is generally true, it is a fact that at times the office organization is far from what it should be. This, we believe, has been due to a feeling that an office can very well run itself, and that in the final analysis it is not of the same degree of importance as the other branches of the gas company, such as the operating department or sales department, for example.

It is not our intention to make any comparisons between the relative importance of various branches of the gas industry. Each has its duties to perform; each forms an important member of the entire organization. You cannot make gas efficiently without a good operating department, and it does not do you much good, on the other hand, to make gas unless you have an efficient sales department to sell it. On the other hand, if records of the company are not properly kept and not easily available, or if the duties of the office, such as sending out bills, collections, answering complaints, etc., are not properly carried out, then, in spite of efficient sales and manufacturing organizations, the gas company will find that it will get into a great deal of trouble with its customers.

Thus, to anyone who makes a careful study of the problem, it will be manifestly clear that a well-organized and well-managed office organization will do much to promote the interests of the gas company and will be reflected, not only in greater sales, but also in better satisfied customers and in enhanced goodwill and friendliness in the community served.

It is hoped that this series of articles, which will run for about a year, will demonstrate to office managers, to office employees and to the executives of the company as well, the peculiar importance and significance of the office system and of the value of an efficient office staff. Each article will cover a specific subject relating to the organization, operation and management of the office. We take pleasure in calling their attention to this series of articles and shall be glad to have comments and criticisms regarding same.

✡ ✡ ✡ ✡

GAS OUTLETS IN THE HOME

It has been emphasized many times that the average house that is built these days does not possess gas outlets except in the kitchen. The house that is constructed in this fashion is not a good prospect for gas in the strict sense of the word. It is true that such a house may provide an opening for the use of gas for the simple purposes of cooking and water heating, but today there are many other ways in which gas can be used to advantage in the home, and the home dweller cannot benefit from gas service to its fullest extent unless proper outlets are available in the house for making gas connections.

The home builder, the architect and the contractor have been urged time and again to see to it that there are adequate outlets in each room for the house, for there may come a time when the owner of the house may desire certain gas service and be unable to secure it except at the expense of tearing up floors and walls in order to lay gas pipes. The time to do this is when the house is being built, for, as there are many new applications to which gas is being put in the home today, such as in incinerators, water heaters, refrigerators and house heating, the home builder will be indeed wise to provide for as many outlets for gas service in his home as may be conveniently and practically possible. For surely there will come a time—if indeed it is not already imminent—when he will want to use gas for one or more of these purposes, in addition to its use for cooking in the kitchen.

Then the value of the added gas outlets will be clearly demonstrated. It will be an easy matter both for him and the gas company to install the additional gas service.

GAS IN MAKING THE ELECTRIC LAMP

(Continued from page 454)

Molybdenum ores are also treated at the Little Ferry plant. Pure molybdic acid is extracted from the ore and is then heated in carbon crucibles in a large crucible gas furnace to a temperature of approximately 2500 degrees F. The resulting mass is removed to another tube furnace. This furnace is five feet long and carries three six-inch tubes which project from either end. Metal boats are

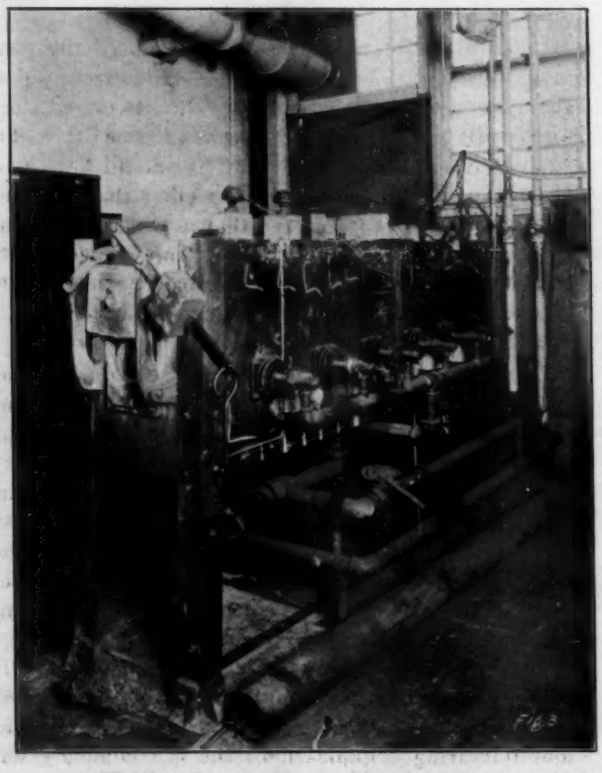
Molybdenum Reduction Furnace

used to convey the material through the tubes. Hydrogen is circulated through these tubes and the reduction to metal is completed.

The moybdenum metal powder is worked into wire similarly to tungsten at the Harrison Wire Works. This wire is used as supports for the tungsten filament in the lamp.

Owing to the difference in expansion and contraction between tungsten and glass, and the non-bending properties of these two elements, a special duplex wire has been developed to lead in through the glass stems of the Mazda lamp. The tungsten wires are clamped to these duplex wires before they are placed inside the glass bulbs. The furnace shown in the illustration No. 3 is essentially vital in the process of producing this duplex or "lead-in" wire. The purpose of this brazing furnace is to bond the iron alloy core to the copper sleeve. This must be done in a very thorough manner, so that the sleeve will adhere to the iron-core throughout all subsequent fabrication of the material. The percentage of each of these constituents must remain constant throughout all processing.

This delicate work is accomplished in a surface combustion furnace especially adapted for the job. The core rods are about six feet long, over which a very thin sheet of brass is wound. This is then inserted into a copper tubing sleeve. A number of these assembled units are placed in pipes running through the furnace and heated to between 1920 degrees F. and 1940 degrees F. The several thermocouples, throughout the length of the heat zone must register within this range, for below 1920 degrees F. the braze is unsatisfactory and at 1975 degrees F. the copper will blister. A test is made after the braze, but only one cross-section is taken as a criterion of the entire rod. A poor bond in any other



Welding Core to Sleeve of Duplex Wire

section of the rod may remain concealed throughout the subsequent process of drawing into fine wire. A poorly bonded wire in this case acts as a by-pass of the wire-glass seal, permitting air to leak through. It cannot be detected until sealed in a lamp, at which time it asserts itself. Hence, the perfect heat control of this furnace is an invaluable feature.

(Continued on page 462)

INDUSTRIAL GAS LESSONS

IF IT'S DONE WITH HEAT — YOU CAN DO IT BETTER WITH GAS

Lesson No. 120

Combustion

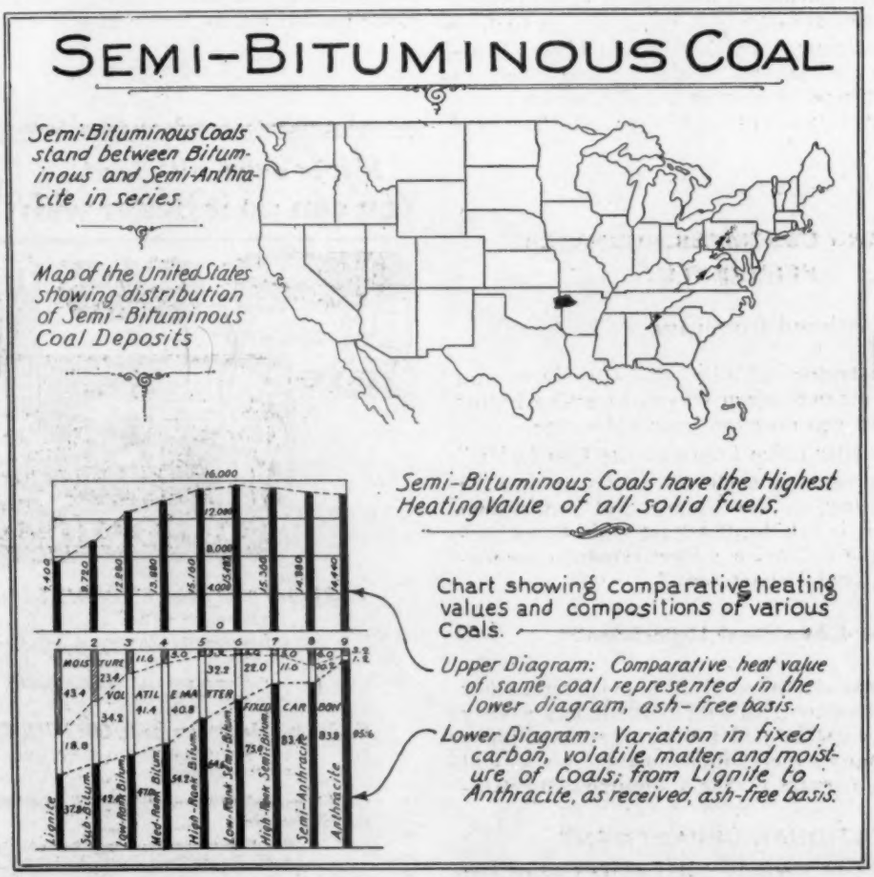
Semi-Bituminous Coal

The next class of coal is called "semi-bituminous." It has been held that this designation is rather a poor one, for it might convey to the reader that this coal is of a lower grade than bituminous coal. However, this is entirely incorrect. The semi-bituminous coal is a coal of a higher rank than bituminous and should properly be called super-bituminous coal.

The semi-bituminous coals are fuels that contain quite an appreciable amount of fixed carbon. They indicate that we are approaching the hard coals in our analysis of the solid fuels. Semi-bituminous coal is practically a non-smoking coal. That is, it burns without the production of smoke that is so characteristic of the combustion of bituminous coal. It is a coal that is sold and used quite frequently for domestic purposes.

An interesting fact regarding the semi-bituminous coals is that they contain such a proportion of fixed carbon and of volatile matter that their heating value is the highest of all the solid fuels. They are therefore very much in demand as boiler fuel for the production of steam.

The analysis of a typical high-grade semi-bituminous coal, which comes from the Virginian-Appalachian region, is given below. The figures shown are on the ash-free, and moisture-free basis.


SEMI-BITUMINOUS COAL
Semi-Bituminous Coals stand between Bituminous and Semi-Anthracite in series.
Map of the United States showing distribution of Semi-Bituminous Coal Deposits
Semi-Bituminous Coals have the Highest Heating Value of all solid fuels.
Chart showing comparative heating values and compositions of various Coals.
Upper Diagram: Comparative heat value of same coal represented in the lower diagram, ash-free basis.
Lower Diagram: Variation in fixed carbon, volatile matter, and moisture of Coals; from Lignite to Anthracite, as received, ash-free basis.
Lignite
Sub-Bitum.
Low-Rank Bitum.
Med.-Rank Bitum.
High-Rank Bitum.
Low-Rank Semi-Bitum.
High-Rank Semi-Bitum.
Semi-Anthracite
Anthracite

	Per Cent.
Volatile matter	16.80
Fixed carbon	83.20
Sulphur	0.79
Hydrogen	4.75
Carbon (total)	90.31
Nitrogen	1.17
Oxygen	2.98
Heating value	15,880 B.t.u. per lb.

The percentage of water in the coal varies from two to six per cent. and the percentage of ash varies from four to eleven per cent. The fact that this coal has the highest heating value is due to the great difference between the heating values of carbon and of hydrogn. That of carbon is only 14,544 B.t.u. per pound, while that of hydrogen is 62,000 B.t.u. per pound. The semi-bituminous coals, particularly those of low range, give more heat per ton than anthracite or any other coal, because they contain just the right proportion of volatile matter, fixed carbon and other ingredients to give a mixture, having the highest thermal value. It must also be mentioned that there are other lower grade coals such as high rank bituminous coals that have a higher heating value than anthracites. This is due entirely to the high percentage of volatile matter, which has a higher heating value per unit than of the fixed carbon.

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HELPING CUSTOMERS BURN GAS EFFICIENTLY

(Continued from page 455)

"Our demonstrator will be glad to show you the newer and more modern ways of getting better results with less gas on even your old range.

"Any time during office hours at the Gas Office."

In addition to running such advertisements as the foregoing, relating to the proper and economical use of the gas it is selling, the East Ohio Gas Company also ran the following advertisement concerning its "Eductaional Department."

The Educational Department

An Educational department is something rather new in a gas company, isn't it? But it has a very real reason for existing and a very important place in the gas company's merchandising methods as will be seen from a perusal of the following advertisement:

"OUR EDUCATIONAL DEPARTMENT.

"First of all, you want to get results out of the gas you burn.

"The fact is that you may be burning right now two or three times as much gas as you need to get the heating results and the cooking results you want.

"Burning gas ECONOMICALLY is, in the final analysis, a matter of burning it RIGHT.

"Our Educational Department is maintained to show you the better ways of using gas.

"A CAPABLE instructor is at your service at all times in the Gas Office."

The same size of space was used by the company for all of its advertisements. This space was eight inches deep by four columns wide.

The Get-up of the Ads

All of the advertisements were presented with very liberal white margins and plenty of white space throughout the type, thus giving them a splendid display and making them very readable.

The use of plenty of white space and a good typographical arrangement went far toward making the advertisements more readable and they were read more than might otherwise have been the case.

Aren't there some worth while ideas and suggestions in all this that can be used to good advantage by other gas companies in making their own newspaper publicity even more effective?

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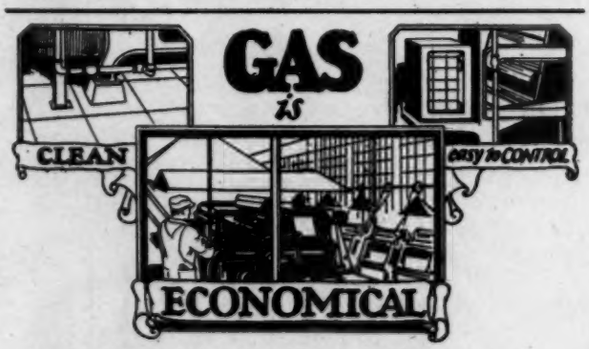
If it is done with heat—
You can do it Better with GAS



GAS in your plant means ECONOMY because

The first cost is the last.

It cuts down the number of men needed to man your machines.

It eliminates overhead waste in hauling, storage, upkeep, retarded production.

GAS in your plant means greater CLEANLINESS because

It is coal stripped for action with all the labor, ashes and muss removed.

GAS in your plant means PERFECT CONTROL of production because

The heat temperatures may be maintained and adjusted automatically with no loss of time or heat.

Let us explain how GAS will increase your output and reduce your production cost. Come in and learn about what other men in industry are doing with the "perfect fuel".

(Your Name and Address Here)

A.G.A.—285

Advantages of Industrial Gas

PROGRESS IN GAS TECHNOLOGY
Domestic and Foreign

SAFETY DEVICE FOR CONTROLLING PRESSURES DURING GAS MAKING

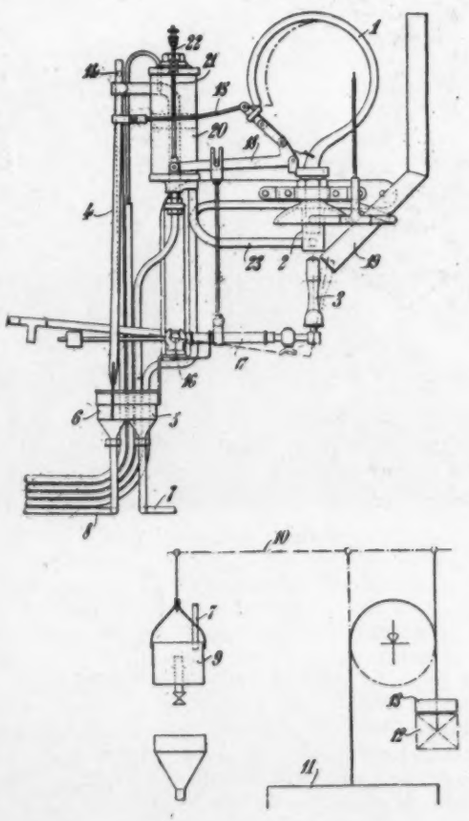
IN the manufacture of gas by destructive distillation of coal or in any other manner, it is necessary to maintain a pressure as low as possible in the retort. This reduced pressure is obtained by means of gas aspirators which draw the gaseous product out of the retorts or the distillation chambers, and after passing it through the various purification apparatus bring it to the holder. In this way a pressure lower than atmosphere is established in the hydraulic main between the retorts and the gas pumps. This vacuum is regulated and maintained by means of an apparatus which is placed near the gas pumps and is called a double-acting regulator.

The purpose of French patent No. 589,438 is the regulation of the vacuum in the gas main by means of a safety appliance, so that the thermal power of the gas is never decreased by accidental admixtures of air.

The apparatus that is used for this purpose is shown in the accompanying illustration. It consists of a regulator similar to a Bourdon tube of the type that is used for regulating the admission of air through the ash pit in the furnace. This regulator, 1, is connected with a small heater tube through which an air current is passed. This heater surrounds the lower height of the regulator, 1. A bunsen burner, 3, is arranged under the heater, 2, and controlls the circulating water at a sensibly constant temperature when the thermal power of the gas that is burned is itself constant. A pipe, 4, which is fastened to a pivot at, 14, and connected with a rod, 15, to the regulator, 1, is traversed in its upper part by a current of water which it allows to flow out in a continuous manner into one or the two other burners, 5, and, 6. These furnaces are furnished with pipes, 7, and, 8, which run respectively into an equalizing tank, 9, which is fastened to the end of a wire, 10, which is part of a hydrostatic balance. This is located over an ordinary double-acting regulator shown at, 11. At the other end of the wire is a constant weight, 12, and the additional weight, 13.

When the gaseous product is normal, the temperature which is evolved by the flame of the bunsen burner, 3, just below the end of the regulator, 1, maintains the latter in an open position in such a manner that the rod, 15, whose length is consequently fixed, effects the movement of the pipe, 4, by causing it to pivot around its axis, 14, thereby directing the flow of liquor through this pipe into the funnel, 6.

As the bunsen burner, 3, has previously been regulated for maximum admission of combustion air, as soon as the calorific power of the gas, which feeds it, diminishes, due either to the introduction of air or of air gas into the coal gas from the retort or to any other cause, the calorific power of the flame then diminishes and the regulator, 1, cooled by the circulating water contracts and this movement is transmitted to the rod, 15. The tube, 4, then oscillates in such a manner that the flow of liquor through it is directed into the funnel, 5, with the result that the water flows into the container, 9. The weight of the latter is thereby increased and the counterweight, 13, is raised and the vacuum effect in the main disappears.



When the gas comes back to normal again the regulator, 1, is again directed into tube, 4, and is moved so as to direct its lower end over the opening of the funnel, 6.

In case of abnormal rise of temperature of the flame, 3, due, for example, to stoppage of circulating water, then a very great action is induced in the regulator, 1, and the functioning of the apparatus is impaired. Means are provided for preventing this from happening.

(Continued from page 458)

Completing the Lamp

The completion of the Mazda lamp is achieved by inserting two duplex wires in the glass stem, which is heated to the melting point and sealed by slight pressure. After the tungsten filaments are welded or pinched on, the whole assembly is then put into a glass bulb and sealed with heat. A small tube is left open through which the bulb is exhausted and the opening immediately sealed. The base is cemented on and the lamp is made.

Swaging Tungsten Wire

These gas-fired furnaces, which are so important a factor in the electrical industry, combine a new type of burner and process of radiation. Low and high pressure systems are used, the type being governed by local conditions, but in both, single valve control features. In the high pressure system a small compressor boosts city gas from line pressure to about ten pounds, and this high pressure gas passes through a patented inspirator, where it sucks in the exact amount of air for perfect combustion. This ratio is maintained without the aid of moving parts or governors and the burners are supplied through the inspirators with a perfect mixture, while the rate of flow or heat control is regulated by means of a single valve.

The low pressure system varies from the high pressure installations in that a pressure blower raises the air pressure to one or two pounds while gas is inspirated at zero pressure and the mixture of the two is controlled by the action of a governor, which automatically maintains an accurate and exact ratio between the two.

Air Gas Mixture Exactly Proportioned

The air-gas mixture coming from the burner is always exactly proportioned for complete combustion and heat radiation, the fastest and most effective heat carrier known, is promoted by playing the flames into or onto a pocketed bed or refractory material. As heat accelerates combustion, efficiency is promoted here and as incandescence promotes radiation further efficiency is gained in this process. Hence these three factors, an unvarying and exact mixture, accelerated and thorough combustion, together with a high rate of radiation, combine to make the most efficient burner yet developed.

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GAS FLAME'S FLICKER GAVE DEFOREST IDEA FOR HIS VACUUM TUBE

The flicker of a gas flame gave Dr. Lee DeForest the clue leading to the invention of the audion, or three-electrode vacuum tube, remarks the Pennsylvania Public Service Information Committee.

It was an accidental discovery. DeForest was experimenting with a primitive type transmitter, a kind of spark coil, when he noticed that every time the transmitter key was operated, the gas light in the laboratory flickered.

The sound waves from the transmitter had caused a change in the gas and air currents within the gas mantle, forcing the gas from the hotter regions down to the less dense spots which were not quite so brilliantly lighted.

This caused a more even distribution of the gases throughout the burner. It is a development of the principle of this phenomenon which is responsible for the action of the modern vacuum tube used by thousands of radio fans.

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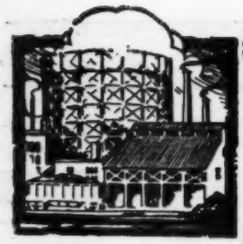
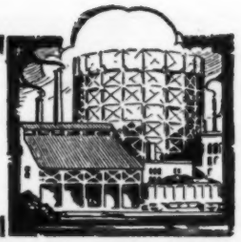
Cooking Demonstration by Brooklyn Union Gas Co. at a Recent Food Show



NEWS OF THE GAS INDUSTRY



Distribution Conference Held in Cleveland About 200 Attend Meeting

The second annual conference of the Distribution Committee of the American Gas Association, held at the Hotel Cleveland, Cleveland, Ohio, May 6, 7 and 8, was attended by more than 200 representatives of gas and manufacturer companies.

The program was very extensive. Ample time was alloted for the discussion of every paper. Every problem that the distribution engineer has to face was treated by men who could speak authoritatively.

A feature of the meeting was the trip through the appliance testing laboratory. R. M. Connor, director, was in charge.

D. A. Powell, New York, N. Y., chairman of the Distribution Committee, and H. W. Hartman, assistant secretary-manager of the A. G. A., were in charge of the program.

F. M. Goodwin, Boston, Mass., reported on "Stoppages, Corrosion and Renewals—Mains and Services." This was discussed by J. D. von Maur, Toronto, Can.

A. H. Anderson, in presenting a report from 32 companies, brought out the fact that 68 per cent. of the miles of mains were cast iron and the remainder steel and wrought iron. The companies reporting to Mr. Anderson operated more than 31,000 miles of mains.

Prof. D. J. Demorest in discussing the investigation of pipe corrosion, emphasized the fallacy of using ordinary life tables for calculating the life of a distribution system. This paper was actively discussed. The use of recess couplings was mentioned as having been very successful in the discussion that followed the paper read by James Ashworth of Jersey City, N. J.

An important subject, presented by W. E. Klemen of Milwaukee, Wis., was distribution safety organization. This was followed by a report on electrolysis by W. W. Conklin which indicated that progress was being made along these lines by the gas companies. The accounting of mechanical equipment was the subject of M. F. Reeder's paper and he said that the committee in charge of this work had prepared a classification which they feel will allow obtaining of definite data in the future.

Other papers were on pumping main valves by G. D. Dodd of St. Louis, Mo.; fitting shop practice, by Joseph Lucena, of Syracuse, N. Y., and appliance installation and piping by J. T. White, of Brooklyn, N. Y.

J. K. Crowell, of Yonkers, N. Y., used a chart to describe the outstanding features of house governors. An interesting summary was entitled "Distribution Wrinkles," which was prepared by J. H. Waldron, of Brooklyn, N. Y. Meter shop practice was gone into in detail by E. S. Umstead, of Providence, R. I., and in a short talk K. H. Logan, of the Bureau of Standards, told what the government was doing on soil corrosion problems.

M. I. Mix, of Chicago, Ill., had as his subject the effect of dehydration in main and service deposits. Another interesting summary was that prepared by R. H. Whipple, of Philadelphia, Pa., on welding mains and devices. The welding experiences at Chester, Pa., were discussed in detail in this paper.

The meeting was one in which great interest was shown both in the attendance and in the briskness and business-like character of the reports and the discussion.

Distribution Men Gathered in Front of A. G. A. Testing Laboratory in Cleveland, Ohio

Fifth Annual Conference of Peoples' Gas Employees

Chicago, Ill.—A report of the proceedings of the Fifth Annual Conference among employee representation in the Peoples' Gas Light and Coke Company, has just been issued. This conference took place on March 4th, and was proceeded by a "get-together" dinner, with music and community singing. Samuel Insull, president of the company, and Colonel Hal S. Ray, Personnel of Public Relations Director of the Chicago, Rock Island and Pacific Railroad, addressed the meeting. The program itself was under the direction of Bernard J. Mullaney, vice-president in charge of Public and Industrial Relations, and A. H. Thorn, manager of Industrial Relations of the People's Gas Light and Coke Company.

William J. Welsh Elected President of Savings Institution

New York City (Staten Island), N. Y.—William Welsh, the well-known president and manager of the New York and Richmond Gas Company, who has led that institution to success and put it on a solid foundation, is now president of the Staten Island Savings Bank, having been elected to that office by the board of directors of the bank.

He has been active and prominent on the board of directors for years past, was first vice-president of the bank when he was promoted to the presidency, was chairman of the building committee which was responsible for the splendid new edifice which now houses the bank, and has held positions of influence requiring judgment and discernment of a high order in the bank as well as in connection with other Staten Island affairs which demanded superior intelligence and experience, and has never failed to increase the esteem and confidence of his fellow-citizens.

The Staten Island Savings Bank will progress and prosper under his guidance and will continue to serve the people as one of the best friends they ever had. The mantle of E. C. Bridgman is fallen on worthy shoulders which are broad enough and sturdy enough, and the head above them brainy enough, to bear any weight that may be placed upon them.

Mr. Bridgman has been elected to the office, which is usually bestowed on the president of an organization of established repute who retires from the presidency of it with distinguished honor. He has been made chairman of the board of directors and his knowledge and ability and counsel will not be lost to the bank which they have served so well for many years.

* * *

Adirondack Industrial Schedule Approved

Albany — The Public Service Commission has approved a new schedule filed by the Adirondack Power and Light Corporation, providing a classification under which gas may be used for industrial purposes in Glens Falls. This is accomplished by reducing the rates for gas consumed in excess of 20,000 cubic feet.

Under the old schedule consumers paid $1.80 per M. for all gas consumed in excess of 10,000 cubic feet. Under the new schedule the rate descends gradually, as follows: $1.80 per M. for all consumption between 10,000 and 20,000 cubic feet; $1.60 for the next 10,000; $1.50 for the next 20,000; and $1.45 for all over 50,000 cubic feet.

* * *

UTILITY EARNINGS RISE

Twin State Gas and Electric Reports $1,705,711 Gross

Report of the Twin State Gas Company for the year 1925 shows that the gross earnings including merchandising sales amounted to $1,705,771. This compares with $1,547,377 for the previous year and is a gain of 10 per cent. The increase in gross earnings is said to be due to additional business and to the extension of the company's service to new communities.

Net earnings for the year were $391,110, which, compared with $354,651 for 1924 shows an increase of $36,458, or approximately 11 per cent. On December 31, it is reported, the company was serving 35,599 electric customers, an increase over the previous year of 2,428. Gas customers were also increased from 4,933 to 5,212, making a total of 30,811 customers served.

* * *

Greenville Plant Purchased

Greenville, Ohio.—Two Greenville men are named in articles of incorporation issued to the Western Ohio Public Service Company of Greenville. They are George W. Mannix, attorney, and Edward Kagey, present superintendent of the Janatha Light and Fuel Company.

The other incorporators are Pierre F. Goodrich, an Indianapolis attorney; W. W. Goodrich, of Winchester, Ind., and W. F. Cutting. P. F. Goodrich is president of the new company; Judge Mannix is vice-president, while W. W. Goodrich is secretary-treasurer.

The head offices of the company will be in Greenville, and they have taken over the entire business of, and succeed, the Janatha Light and Fuel Company in Western Ohio. The gas franchises now being operated under the new company are those at Greenville, Eaton, Brookville, West Manchester, Castine, Yellow Springs, Osborn, Fairfield and other places. It is expected that the plant now supplying gas to Union City will become a part of the property of the new company. It is now operated by the Union Gas Company, but it may become a part of the Winchester Gas Company, operated by the same company.

Under the charter granted to the new company it is also authorized to operate electric light and power plants, and to use either natural or artificial gas in its plants.

The company was incorporated for $400,000, and the officials expect to improve the service to the highest point of efficiency and to give their patrons the best service that money can provide.

Wisconsin Gas Men Meet in Annual Convention—Many Interesting Papers Are Read

The annual meeting of the gas section of the Wisconsin Utilities Association was held on May 13 and 14, 1926, in the Hotel Retlaw, Fond Du Lac, Wis.

The first meeting of the gas men was in the nature of a technical session on Thursday morning, May 13. The address of welcome was made by Mayor R. D. Haentze of Fond Du Lac. This was then followed by an address by the chairman, S. B. Sherman.

Geo. E. Wagner, President Gas Section, Wisconsin Utilities Association

The first paper in the morning was read by Professor Kolwalke and A. W. Carlson of the University of Wisconsin. It was in the nature of the Gas Fellowship Report. This paper was concerned with experiments on the proper size of combustion chamber for furnaces. The paper was followed by a discussion and then by another paper read by George E. Wagner of the Madison Gas and Electric Company, on "Gummy Deposits in Mains and Meters." Mr. Wagner brought out in his paper that in the desirable gas for distribution high boiling point fractions of the light oils should be low and the benzine fraction always adequately high, to keep the high boiling point fractions in solution if it should condense. This makes it necessary to approach complete decomposition of the oil in the water gas set. The results of tests, made in the Madison plant, show that the essential requirements for the effective decomposition of the oil are as follows: Fineness of sub-division of oil, temperature, intimacy of contact and rate of oil input.

Between the morning and afternoon sessions a luncheon was held for the gas men in one part of the hotel and for their ladies and visitors in another part. In the afternoon, reports were read by various representatives on the managing committees of the American Gas Association.

Sales—The National Problem

R. J. Canniff, chairman of the Commercial Section of the American Gas Association, delivered a talk on "Sales, the National Problem" and pointed out the fact that the co-operation of all gas men throughout the country is required in order to obtain real sales results.

L. J. Willien of the Byllesby Engineering and Management Corporation then delivered a talk on the work of the technical section of the American Gas Association, discussing the various plans of the section and the work that is being done by the various committees which is of special importance to the technical gas men in the entire industry.

After the meeting the gas men went on a inspection trip to the Vertical Retort Coal Gas Plant of the Wisconsin Power and Light Company.

Annual Dinner

The annual dinner of the association was held Thursday evening in the main dining room of the Hotel Retlaw. The music was furnished and the entertainment program included Royal McLain and Clea and Ruth Smith of Fond Du Lac. Professor W. C. Hewitt of the Oshkosh Normal School, well-known educator and humorist, was selected to tell the new stories. Souvenirs were given the visiting ladies. The dinner was followed by dancing.

Friday Morning Session

The first paper of the Friday morning session was by G. H. Head of Wisconsin Gas and Electric Company. His paper was entitled "Industrial Gas Problems and Progress." The paper was followed by the election of officers. A. E. Schuetz, industrial engineer of the Milwaukee Gas Light Company, was elected vice-president of the Gas Section of the Wisconsin Utilities Association, and George E. Wagner, general superintendent of the Madison Gas and Electric Company, Madison, was elected president, succeeding S. B. Sherman of Racine.

Two papers then followed, one by Lewis Stein of the Northern States Power Company on "Recent Development in the Gas Business." Mr. Stein discussed the most important technical developments in coal and water gas manufacture in recent years. A final paper was read by Fred Hainer of the Wisconsin Power & Light Company on "Application of Gas to Railroad Shops." Mr. Hainer described the use of gas in the shops and gave the results obtained from gas-fired furnaces compared with oil-fired furnaces. Results have shown that the use of gas has offered decided savings, in addition to all the inherent advantages of the fuel, such as cleanliness, improved working conditions, ease in handling and greater safety.

A. E. Schuetz, Vice-president Gas Section, Wisconsin Utilities Association

In the afternoon the gas men were taken on an inspection trip through the Soo Line Railroad shops, which included demonstrations of the gas flue furnace, paint burning and tire removal.

Academy of Music Closes Its Doors

New York City.—The famous old theatre and opera house, the Academy of Music, closed its doors Tuesday, May 18th, with a ceremony in which veterans of the stage took prominent part. This famous theatre will soon be torn down to make way for the erection of an office building for the Consolidated Gas Company of New York City.

The Hon. Joseph P. McKee, president of the Board of Alderman of the City of New York, delivered a talk as representative of the city. George B. Cortelyou, president of the Consolidated Gas Company, who was the host of the occasion, also spoke and recalled some of the high spots in the history of this theatre. A very interesting address was also delivered by the well-known actor, Otis Skinner. He talked of the days when he came to New York and of the various men and women who performed at the Academy.

Mme. Alda of the Metropolitan Opera House sang, and the Gas and Electric Chorus Society also sang old songs. The music was played by the New York Symphony Orchestra.

The audience was a very representative one and contained many who had seen performances at this theatre in the past years. The ringing down of the final curtain marked the end of the Academy's long service and the beginning of additional service to the people of New York in a building erected and to be occupied by their gas utility.

Gas and Electrical Choral Society of sixty (60) voices. These young men and women are employed in the offices of the Consolidated Gas Company of New York and its affiliated gas and electric companies. This society figured largely and prominently in the closing enertainment in the Academy of Music, New York City, on May 17, 1926. Specially made costumes of the period of 1860.

* * *

Photo taken in the Academy of Music on May 17, 1926, with the N. Y. Symphony Orchestra on the stage just before the commencement of the closing entertainment. This shows the proscenium of boxes and arch of the historical old edifice.

These young women (37 of 'em) were the ushers in the Academy of Music on May 17. The photo was made in the lobby just before the closing performance began. All the girls are members of the Woman's Service Club of the Consolidated Gas Company of New York and its affiliated gas companies. Specially made costumes of the period of 1860 were worn by the young women in the photo, who are listed at bottom of page.

* * *

Misses May George, Elizabeth Fahey, Mary Turley, Mildred Boak, Mary McAlevy, Fannie Cauldwell, Florence McElroy, Constance V. Raynor, Mary A. Sayers, Elizabeth C. Hallahan, Elizabeth M. Perkins, Constance Ward, Genevieve Karlinger, Sigrid Johnson, Helen Hayes, Dorothy Kraft, Mildred Isoldi, Edna Bundschuh, Pauline E. Moon, Thelma Reidy, Anna Ronner, Olga Hodga, Katherine Nordenholt, Alice Kelleher, Florence Gasson, Bertha Eisman, Jessie Beckner, Lillian Scarbeck, A. V. Anderson, Celia Jackson, Jessie Fawcett, Ethel A. Furey, Madeline Endres, Amelia Ledogar, Helen Fromatter, Rose Barranco, and Mrs. Marion Brewer.

Big Central Gas Station Planned by Illinois Firm

Northern Utilities Prepares to Interconnect Systems at Sterling, Ill.

New York City—The success obtained by electric power companies through interconnecting their systems by transmission lines has apparently led the Illinois Northern Utilities Company to try the same thing with its gas properties. Plans are being perfected by this company for the erection of a large central gas station at Sterling, Ill., which will have a total maximum daily capacity of 1,200,000 cubic feet of combined coal and water gas.

By means of a high pressure system of mains, the central station will be a common generating source, from which Dixon, Sterling, Rock Falls, Morrison and interlying territory will be supplied with gas. At present each of these towns has its own small plant.

In addition to the plant, a large gas holder with a capacity of 500,000 cubic feet will be erected, while the smaller holders at the individual towns will also be continued in service. Both new buildings will be modern in every detail.

"In addition to supplying the customers with gas satisfactorily, the new plant with the economies effected in gas generation will ultimately tend to be effective against increase in gas rates," officials say. The installation of this central gas generating plant will provide facilities to meet the future increased consumption and usage of gas. It is expected that this large and practical improvement will be completed by the latter part of this year."

New Uehling Representative

Henry Eggelhof, P. O. Box 945, Dallas, Texas, was recently appointed exclusive representative for the eastern half of Texas by the Uehling Instrument Company of Paterson, N. J., manufacturers of CO_2 recorders and other power plant instruments.

* * *

Gas Concern Chartered.

Providence, R. I.—Suburban Gas Company of Rhode Island, to be located in Cranston, for the purpose of dealing in gas, stoves and appliances, has obtained a charter. The capital stock is $50,000 and 200 shares of common without par. The incorporators are Norman Wigglesworth of Norwalk, Conn.; Carl G. Nourse, of Providence, and Frederick P. Young of Hyannis, Mass.

* * *

Will Test Three-Rate Part

Topeka, Kan.—The Kansas Public Service Commission granted authority to the Capital Gas and Electric Company of Topeka, and the Kansas City, Kan., Gas Company, to install additional limiting devices for the purpose of enabling customers to try out the three-part rate being advocated by the Doherty Gas Company.

Officials of the Doherty interests appeared before the commission and filed their applications for permission to install 400 in Kansas City, Kan., and Topeka. Installation of the devices will be optional with customers.

* * *

Ajax Brass and Iron Company Moves to Larger Quarters

The Ajax Brass and Iron Company, manufacturers of the Shur-Stop Range Cock, has moved to more commodious quarters at Washington and Fifteenth Streets, West New York, New Jersey.

Their New York office, which was formerly located at 59 Pearl Street, has been discontinued. All transactions in future will be carried on at the new address.

The Standard Peninsular Brass Company, licensed manufacturers of the Shur-Stop Range Cock, will continue to supply the Western territory, as heretofore.

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Gas Men to Make Boat Trip

Those gas men who are able to take advantage of the invitation of the Canadian Gas Association, which will meet at Montreal on July 8th and 9th, will also have an opportunity to take a boat trip on the St. Lawrence River and Lake Ontario. The boats make this famous trip regularly, and the gas men are assured of excellent accommodations. As this is a very fine scenic trip, all those who will be able to do so should make it.

Arrangements are also being made to take in the famous Saguenay River trip.

For further information on these trips, the gas men are advised to write to G. W. Allen, Secretary-Treasurer of the Canadian Gas Association, 7 Astley Avenue, Toronto, Ontario, Canada.

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Scottsbluff to Have Gas

Scottsbluff, Neb.—A franchise has been granted to J. W. Rogers of Scottsbluff, Nebraska, to furnish gas to that town. It has a population of 8,200, and is located in a richly irrigated district. The Great Western Sugar Company has a factory there. The installation, which will be used in gas making, will be a Wilcox set for the complete gasification. The company is to be customer owned.

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Approval Seal of A. G. A. Laboratory

The following illustration shows the approval seal of the A. G. A. Testing Laboratory, which will be carried by all gas appliances tested and approved by the laboratory.

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Adirondack Power Franchise Modified

Albany, N. Y.—The Public Service Commission today amended the franchise of the Adirondack Power and Light Corporation for a gas transmission line through the town of Colonie, Albany county, to permit it to sell gas in the town to the Municipal Gas Company. The Municipal Gas Company has no mains in some parts of the town through which the Adirondack's mains extend and it will purchase the gas from the Adirondack and distribute direct to customers.

The Peoples' Gas Light and Coke Co. Issues Year Book

Chicago, Ill.—The 1926 Year Book of the Peoples' Gas Light & Coke Co. of Chicago, Ill., covers the history and operations of that company in the year 1925. The book is a very attractive one and it has a really excellent cover done in poster style. The book describes in detail the financial and business operations of the company during the year and gives a statistical analysis and forecast of the consumption of gas in the city of Chicago for the next twenty-five years. It is indicated that the percentage increase of business by the year 1950 will be approximately 1,650 per cent. over that in 1900, which is taken at 100 per cent. The business in 1925 was approximately 450 per cent. increase over 1900; thus in 1950, or in twenty-five years, it is indicated that the gas sales in Chicago will increase by approximately 280 per cent.

A part of the book is devoted to a description of use of gas in industry, in house-heating and the like.

A detailed financial statement is also included.

W. Scranton Heads Gas and Water Co.

Scranton, Pa.—At the annual meeting of the Scranton Gas and Water Co., Worthington Scranton was again elected president, and Joseph Jeffrey, secretary.

Directors elected were: George E. Smith, H. A. Knapp, C. S. Woolworth, Worthington Scranton and Joseph Jeffrey.

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U. G. I. Officials Confer

Philadelphia, Pa.—The United Gas Improvement Company recently held a conference of engineers and officials of all subsidiary companies at the Benjamin Franklin Hotel.

Samuel T. Bodine, president, opened the meeting with an address. Technical papers were read by F. C. Hill, of this city; L. W. Seltzer, Reading; Joseph Butler and Joseph Lucena, Syracuse, N. Y., and D. P. Allen, Meriden, Conn. A discussion on advertising was opened by W. F. O'Donnell, of this city, eleven other papers on a variety of subjects following.

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At the Sanitary and Heating Convention

Denver, Colo.—Engineers from many parts of the United States attended the annual convention of the Colorado Society of Sanitary and Heating Engineers' convention and, while much of the work was applicable to the plumbing trade, heating units came in for their share. In convention it was stated that it's the woman of the house who really buys the heating units and because of that fact we should have our place in such condition that we are always prepared for lady callers. "If our place is dirty, dusty and ill arranged we will not make a sale" is just what it all meant.

E. B. Clayton of Denver was elected president of the association.

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Gas Men Good Bowlers

San Diego, Calif.—The bowling team of the Southern California Gas Company, which entered the Pacific Coast Bowling Congress Tournament, held recently in San Diego, took first place on the opening night of the tournament in the 810 class and third place in the open five-man event.

This is one of the largest tournaments which has so far been held, there being entered 169 teams from the Pacific Coast, including Arizona, Utah and Nevada.

Arrangements are being made for a tournament to be played between the teams of the San Diego Consolidated Gas and Electric Co. and the Southern California Gas Co.

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R. C. Markham Head of Middletown Gas Company

Middletown, Conn.—Several important changes in officers and directors of the Middletown Gas Light Company were authorized at a special meeting recently at the office of the corporation. These were occasioned by the death of the late Daniel William Camp, president and director of the corporation.

Revilo C. Markham, chairman of the board of directors of the Central National Bank and vice-president and a director of the gas company, was elected president of the organization. James E. Wilson, a director, was elected vice-president to fill Mr. Markham's place. J. Gordon Baldgin will continue in the office of secretary and treasurer.

Charles A. Learned of Meriden was named a director in place of Mr. Camp. Mr. Learned is manager of the Meriden division of the Connecticut Light and Power Company.

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Ponca Utilities Firm Plans New Merger

Ponca City, Okla.—The American Utilities Company, with headquarters in Ponca City, has made an offer for the Mullendore Gas Company, which supplies Stillwater and several other cities, with the view of adding it to the string of utilities recently purchased in six cities in northern Oklahoma.

The negotiations announced in the merger of the six companies involved nearly $3,000,000, it was reported. Five cities were affected by the sales. They are Blackwell, Tonkawa, Hominy, Cushing and Billings.

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Tampa Thermalene Gas Co. Receives Charter

Tampa, Fla.—Charter of the Tampa Thermalene Gas Company has been received permitting formal organization and preparation of definite plans for operation.

Service plants will be established in community centers throughout the country. These will produce and compress the gas into tanks for distribution in homes for cooking, lighting or heating. Portable producers for home and industrial use will be manufactured exclusively in Tampa.

It is believed the plant will be in operation early this summer. Plans call for employment of 30 men at the start with gradual increase to 200 or more in a year.